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ABSTRACT

A survey of entering freshmen at the United States Naval Academy was made in 1970 and 1971 to find their intended major. These tentative major choices were compared with high school physics background. The sample consisted of 2,510 students from all 50 states. Tables included are physics background, percentage choosing physics major, percentage taking college-level high school physics, major choices vs. high school physics background and percentage of technical major choices. In each case, the sample was subdivided into groups which had taken Physical Science Study Committee (PSSC), Harvard Project, conventional, or no physics course in high school. A slightly higher percentage of PSSC students chose a technical major due to a larger number of engineering choices, but a greater percentage of students from conventional courses chose physics as a major. The number of students from Harvard Project Physics was too small for valid conclusions. Differences in high school physics background did not make large differences in major choices, except that those who did not take physics in high school avoided all technical majors, while a large percentage of those with a second year of high school physics chose technical majors. (Author/TS)

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Choice of Academic Major in
College vs High School Physics
Background

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In the past two years at the U. S. Naval Academy we have been looking at the various factors which influence the choice of academic major by our students. Although the choice is not made until the end of freshman year, we have surveyed the classes entering in the summers of 1970 and 1971 prior to the start of classes to find their intended major when admitted. I have compared these tentative major choices with high school physics background to see if certain types of courses motivate students into particular majors. Since our sample is 2510 students coming from all 50 states in the same proportion as the state's representation in Congress, the results may be of interest to physics teachers. The entering class in 1970 numbered 1361. Due to a smaller number of resignations than in the previous year, the class was smaller in 1971 and in addition there were some absences when the survey was made so that the number of students responding was 1149.

Table I - Physics Background of USNA Plebes 1970,71

<u>High School Physics Course</u>	<u>1970</u>	<u>1971</u>	<u>1970 + 71</u>
PSSC	28.2	25.9	27.1
Harvard Project	2.6	3.6	3.1
Conventional	58.0	57.0	57.5
None	11.2	13.5	12.3
H.S. College Level	3.5	6.8	4.8

Table I gives the percentages of the classes entering in 1970 and 71 with PSSC, Harvard Project, conventional physics, no physics, and with a second year of physics, at college level, in high school. It can be seen that the number with PSSC is decreasing, the number with Harvard Project and with no physics is increasing. The number of PSSC students increased through the early sixties to a high of 39% in 1967 and has been falling since. The number with no high school physics reached a low of 4.3% in 1960 and remained under 5% for seven years before beginning a rapid rise.

The surprising feature is the marked increase in the number of students with a second year of high school physics at the college level. A wide variety of textbooks are used including such standards as Sears and Zemansky's University Physics and Halliday and Resnick. Table II gives the percentages

of students with each type of first course who take a second course in high school. It can be seen that students with a conventional first course more often take a second course.

Table II - Percentages of Students Taking College Level High School Physics Course

<u>First Course</u>	<u>1970</u>	<u>1971</u>	<u>1970 + 71</u>
PSSC	1.04	2.35	1.62
Harvard Project	0.00	7.32	3.90
Conventional	5.45	10.38	7.69

In Table III we have the percentage of students from each high school background who chose a physics major.

Table III - Percentage of Students Choosing a Physics Major

<u>High School Physics Course</u>	<u>1970</u>	<u>1971</u>	<u>1970 + 71</u>
PSSC	2.9	3.7	3.2
Harvard Project	11.1	2.4	6.5
Conventional	3.5	4.9	4.2
None	1.3	1.3	1.3
H.S. College Level	6.4	6.4	6.4
Total Class	3.3	4.0	3.6

When these figures were first compiled in 1970, it appeared that the Harvard Project Physics was vastly superior in motivating students to choose a physics major. This was an example of a conclusion based on too little data: 4 of 36 students had chosen physics. In 1971 the trend was reversed with only 1 of 41 Harvard Project students choosing physics. The combined years, 5 of 77, gives a better, but still small sample picture. On the other hand the sample is 681 PSSC students and 1444 with conventional high school courses, so that it seems safe to say that the PSSC course does not produce more physics majors.

Table IV - Major Choices vs High School Physics
Background for USNA Plebes 1970+71

Major Choice	PSSC	Harvard Project	Conventional	No Physics	Total
Physics	3.2	6.5	4.2	1.3	3.6
Bioscience	2.5	2.6	2.0	1.0	2.0
Chemistry	4.1	3.9	3.9	2.0	3.8
Mathematics	6.3	10.4	6.2	4.5	6.2
Oceanography	15.6	9.1	15.2	12.7	14.8
Engineering	35.6	33.7	33.3	24.3	32.8
US & International Studies	15.1	15.6	14.8	19.5	15.5
English-History	4.8	5.2	3.8	10.0	4.9
Ops Anal-Manag	12.8	13.0	16.6	24.7	16.4

Table IV gives a breakdown of percentages of students with each type of high school physics background choosing each major. All engineering majors, electrical, mechanical, etc., are combined. The U.S. and International Studies includes foreign affairs, political science, economics, and area language studies. English and History are also combined as are Operations Analysis and Management in the last category. The Bioscience major, which is a pre-medical program, was only instituted in the summer of 1971. This table shows little in the way of surprises. Students from Harvard Project seem to major more in mathematics and less in oceanography, but this is based on only 77 cases. Those who avoided physics in high school seem intent on avoiding science and engineering in college as well.

When the majors in all the sciences, mathematics, and engineering are combined we have the result shown in Table V.

Table V - Percentage of Technical Major Choices

High School Physics Course	1970	1971	1971+72
PSSC	64.2	71.1	67.3
Harvard Project	63.8	68.3	66.2
Conventional	60.7	69.9	64.8
None	40.5	51.0	45.8
H.S. College Level	70.3	71.7	71.2

Thus we see that a slightly higher percentage of PSSC students choose a technical major due to a larger number of engineering choices, but a greater percentage of students from conventional courses choose physics as a major. The number of students from Harvard Project physics is too small for valid conclusions. Differences in high school physics background does not make large differences in major choices except that those who did not take physics in high school avoid all technical majors, while a large percentage of those with a second year of high school physics choose technical majors.